

# **3M™ Environmental Scrub Sampler with 10ml Wide Spectrum Neutralizer:** Effective pick-up and recovery of bacteria from surfaces

3M™ Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer can be used to effectively collect environmental microbial samples in the presence of commonly used sanitizers in the food and beverage industry.

## **Objective**

Demonstrate that 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer can effectively pick-up and recover bacteria from typical environmental surface types present in the food and beverage industry (e.g., stainless steel, ceramic tile).

## **Experimental Design**

To assess qualitative bacterial recovery, the 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer was used to sample 4" x 4" stainless steel and ceramic tile coupons that were inoculated with the four bacterial strains listed in Table 1 (n = 52 per surface type).

25 µL aliquots of low-level inoculum solutions (100–1000 CFU/mL) of each bacterial strain listed in Table 1 were pipetted onto coupons of each surface type (n = 13 per bacterial strain). The coupons were allowed to dry at room temperature for 1 hour to achieve low/fractional positive results.

For spike controls, three coupons of each surface type per organism were flooded with either 10 mL of 3M™ Wide Spectrum Neutralizer or 10 mL Neutralizing Buffer (NB). Quantitative analysis for control coupons was performed using 3M™ Petrifilm™ Rapid Aerobic Count Plates incubated at 35°C for 24 hours and enumerated following the manufacturer's instructions for use.

For each sample coupon, a new 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer or 3M™ Hydrated Sponge with 10 mL Neutralizing Buffer (NB) was used to sample the inoculated surface (n = 10 per bacterial strain per surface type). Samples were collected following the manufacturer's instructions for use.

Following sampling of the inoculated coupons, 3M Environmental Scrub Sampler and 3M Hydrated Sponge sample collection devices were transferred back into their respective bag and then enriched via the protocols listed in Table 1.

Once sample enrichment was completed, each sample was analyzed by the appropriate 3M™ Molecular Detection Assay 2 following the manufacturer’s instructions for use. Per manufacturer’s instructions for use, environmental samples containing Neutralizing Buffer (NB) were processed with 10 µL of sample being transferred into the 3M™ Lysis Solution Tube; all other neutralizing solutions used a 20 µL transfer.

**Table 1.** Bacterial strains and enrichment conditions for qualitative analysis

Strain	Strain Number	Enrichment Temperature / Time	Enrichment Media
<i>E. coli</i>	ATCC 51813	41.5°C ± 2°C / 24 ± 2 Hours	BPW-ISO
<i>S. enterica sv Typhimurium</i>	ATCC 13311	41.5°C ± 2°C / 24 ± 2 Hours	BPW-ISO
<i>Listeria monocytogenes</i>	ATCC 7644	37°C ± 2°C / 24 ± 2 Hours	Demi-Fraser + FAC
<i>C. sakazakii</i>	ATCC 29544	41.5°C ± 2°C / 24 ± 2 Hours	BPW-ISO

ATCC®: American Type Culture Collection. Manassas, VA.

**Table 2.** Detection methods

Strain	3M™ Molecular Detection Assay 2
<i>E. coli</i>	<i>E. coli</i> O157 (including H7)
<i>Salmonella</i>	<i>Salmonella</i>
<i>Listeria spp</i> <i>L. monocytogenes</i>	<i>Listeria</i> <i>Listeria monocytogenes</i>
<i>C. sakazakii</i>	<i>Cronobacter</i>

## Results

The 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer consistently had recoveries that were comparable or superior to cellulose sponges hydrated with Neutralizing Buffer (NB) as shown in Table 3 and Table 4. Die-off of the spotted inoculum was observed at a higher rate on stainless steel resulting in fractional recoveries as compared to ceramic tiles.

**Table 3.** Recovery of inoculated bacteria from surfaces

		3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer		3M Hydrated Sponge with 10 mL Neutralizing Buffer	
		Stainless Steel	Ceramic	Stainless Steel	Ceramic
<b><i>E. coli</i> ATCC 43888</b>					
<b>Inoculum</b>	CFU/mL	623	363	640	175
<b>3M™ Molecular Detection Assay 2</b> <i>E. coli</i> O157 (including H7)	# Positive / # Tested	6/10	10/10	0/10	0/10

		3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer		3M Hydrated Sponge with 10 mL Neutralizing Buffer	
		Stainless Steel	Ceramic	Stainless Steel	Ceramic
<b>Salmonella typhimurium ATCC 1331</b>					
Inoculum	CFU/mL	9390	8350	9510	6255
3M™ Molecular Detection Assay 2 <i>Salmonella</i>	# Positive / # Tested	10/10	10/10	1/10	0/10
<b>Listeria monocytogenes ATCC 7644</b>					
Inoculum	CFU/mL	7363	7665	6732	7122
3M™ Molecular Detection Assay 2 <i>Listeria monocytogenes</i>	# Positive / # Tested	3/10	10/10	0/10	2/10
<b>Cronobacter sakazakii ATCC 29544</b>					
Inoculum	CFU/mL	6453	4330	6318	4342
3M™ Molecular Detection Assay 2 <i>Cronobacter</i>	# Positive / # Tested	7/10	9/9*	6/10	10/10

\*Sample lost due to bag leak.

**Table 4.** Summary recovery efficiency\* (%) and one-way ANOVA analysis

Sample Collection Device and Neutralizing Solution	3M Molecular Detection System Assay 2 n = 40	
	Stainless Steel (%)	Ceramic tile (%)
3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer	65	100
3M Hydrated Sponge with 10 mL Neutralizing Buffer	17.5	30

\*Recovery Efficiency % = [(n positive/n tested)\*100]

## Conclusions

The 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer can pick-up and recover organisms similar to or better than cellulose sponges hydrated with Neutralizing Buffer (NB) from common surface types present in the food and beverage industry. This is of significance as accurate and consistent bacterial pick-up and recovery is critical for downstream qualitative and quantitative test result integrity and to support food processors' environmental monitoring programs.



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